REFORMER EXERCISE APPARATUS HAVING A NON-ROTATING SPRING ANCHOR BAR

by

Ken Endelman

Merchant & Gould P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903

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Field of the Invention

This invention relates generally to the field of exercise equipment and more particularly to a reformer type exercise apparatus in which a movable carriage for supporting portions of a user's body is connected to one end of a rectangular frame via elastic members.

Background of the Invention

A conventional reformer exercise apparatus includes a wheeled platform carriage, which rides on a rectangular wooden or metal frame. The carriage is connected to a series of parallel elastic members, e.g. springs, which are in turn connected to a foot end of the rectangular frame. The carriage typically rides on parallel rails or tracks mounted to the longer side of the rectangular frame. This carriage has a flat, padded upper surface and typically includes a pair of spaced, padded, upright shoulder stops and a headrest at one end to support the shoulders and head of the user when the user is reclined on the carriage.

An adjustable foot bar, foot support, or foot rest against which the user places his/her feet is mounted at the foot end of the rectangular frame. A spring support rod is positioned across the foot end of the rectangular frame between the tracks and is held in place by a spring support bracket fastened to the frame. The rod typically fits in one of three or four pairs of upwardly open, slanted recesses or slots in the support bracket. Alternatively, the spring support rod may be permanently fastened to the foot end of the frame. The user can typically push against the foot rest to move the carriage along the track away from the foot rest against spring tension to exercise the leg and foot muscle groups of the user's body in accordance with prescribed movement routines.

The spring support rod is typically a cylindrical rod or tube with a circular cross-section. A series of hooks for securing ends of the elastic members or springs are attached in a line along the cylindrical spring support rod. The other ends of the springs are connected to the carriage.

The springs provide resistance for biasing the carriage toward the foot end of the frame. A user can vary the resistance provided by the springs in order, for example, to change the intensity level of the exercise by selecting different combinations of springs. The hooks on the spring support rod allows a user to easily vary the number of springs by providing an easy way to disconnect the springs from the rod and reconnect the springs to the rod received in the slots. The user may also vary the relaxed spring tension on the carriage by changing the pair of slots into which the spring support rod is mounted. The spring support rod, when mounted in the slots nearest the foot end of the frame, for example, provides the maximum relaxed spring resistance.

The circular cross-sectional profile of the spring support rod allows rotational movement of the rod in the slots when the springs are loosely or are not connected to the rod at all. The spring support rod resting in the slots typically rotates (due to gravity) to a position where the hooks are pointed downward when no tension is applied by the springs. This is inconvenient for the user, requiring the use of one of the user's hands to rotate the bar to align the hooks horizontally while the user places the end of the spring on the hook with the other hand.

Summary of the Invention

A reformer exercise apparatus of the present invention has a generally rectangular frame formed by a foot end and a head end connected to two spaced-apart parallel side frame members. A movable carriage is mounted on the frame for supporting a user and for movement along the side frame members against spring tension from one or more elastic members, such as springs, are fastened between the foot end and the carriage. A pair of spaced-apart elastic member anchor bar support brackets are fastened to the frame

near the foot end, and each supports one end of an elongated elastic member anchor bar. One or more of the elastic members are fastened between the carriage and the anchor bar to elastically bias the carriage toward the foot end of the frame.

Each bracket has a series of upwardly open slanted slots. Each slot is generally U-shaped and has a semicircular concave bottom wall portion extended by a pair of spaced parallel sidewall portions. The two bar ends of the elongated anchor bar are configured to prevent rotation of the anchor bar mounted in the slots about its longitudinal axis.

Thus, when all the springs are removed from the hooks, the hooks remain in a horizontal line parallel to the side frame members since the spring anchor bar cannot rotate about its longitudinal axis. This makes it easy for a user to attach various combinations of springs on the hooks of the spring anchor bar using only one hand.

Brief Description of the Drawings

FIG. 1 is a side view of an exercise apparatus incorporating the present invention.

FIG. 2 is a perspective view of the foot end of the apparatus shown in **FIG. 1** with the foot rest folded down into the frame and the non-rotating spring anchor bar received in the pair of slots of the spring support bracket.

FIG. 3 is a perspective view of the non-rotating spring anchor bar in accordance with a preferred embodiment of the present invention.

FIG. 4 is an end view of the non-rotating spring anchor bar shown in **FIG. 3** received in a pair of slots of the spring support bracket in accordance with a preferred embodiment of the present invention.

FIG. 5 is perspective view of a non-rotating spring anchor bar in accordance with another embodiment of the present invention.

FIG. 6 is an end view of the non-rotating spring anchor bar shown in **FIG. 5** received in one of the pair of slots of the spring support bracket.

FIG. 7 is a perspective view of the foot end of an alternative reformer in accordance with the present invention similar to the apparatus shown in **FIG. 1** except that a spring anchor bar is received in one pair of a series of slots in tubular tracks.

FIG. 8 is a perspective view of the non-rotating spring anchor bar in accordance with a further preferred embodiment of the present invention shown in the reformer of **FIG. 7**.

FIG. 9 is an end view of the non-rotating spring anchor bar shown in **FIG. 8** in accordance with the present invention.

Detailed Description

An exercise apparatus **10** incorporating a preferred embodiment of the present invention is shown with respect to **FIGS. 1-2**. The exercise apparatus **10** has a generally rectangular frame **12**, which has spaced, parallel long sidewalls **14**. The head ends of the sidewalls **14** are joined by a head end wall **16**, and the foot ends of the sidewalls **14** are joined by a foot end wall **18**. Each of the sidewalls **14** carries an inside horizontal rail **20**, preferably made of aluminum angle bar stock having an "L " shaped cross section. The rails **20** are bolted or screwed to the inside surfaces of the sidewalls **14** to form a pair of parallel and horizontally spaced tracks upon which a wheeled carriage **22** rides.

The wheeled carriage **22** has a flat rectangular base plate (not shown) and a carriage cushion pad **28**, which is fastened on top of the flat rectangular base plate. The carriage cushion pad **28** supports portions of a user's body. The flat rectangular base plate has two pairs of roller wheels (not shown) mounted to its underside at its corners. These roller wheels ride along the rails **20** to constrain movement of the wheeled carriage **22** forward and backward between the head end wall **16** and the foot end wall **18** of the frame **12**. A pair

of spaced apart shoulder stops **30** and a headrest (not shown) are fastened to the head end of the flat rectangular base plate.

The exercise apparatus **10** includes an adjustable foot bar support assembly **38**. The foot bar support assembly **38** preferably has a padded horizontal foot bar **40** that is adjustably positioned above the foot end of the frame **12** via support members **42**. Each of the two support members **42** has one end pivotally mounted to the inside of one of the frame sidewalls **14**. The support members **42** are positioned at a location spaced from the foot end wall **18** so that the support members **42** and the padded horizontal foot bar **40** may be folded down parallel with the upper edge of the frame **12**.

The foot bar support assembly **38** is shown folded toward the foot end of the carriage **22** in **FIG. 2** for clarity in description of this invention. The foot bar support assembly **38** further includes a pair of "U" shaped brace members **44, 46**. One end of each of the two "U" shaped brace members **44, 46** is pivotally fastened to one of the support members **42** near its midpoint. The other end of each of the two "U" shaped brace members **44, 46** is pivotally fastened to the other support member **42** near its midpoint. These "U" shaped brace members **44, 46** are of different lengths so that they can position the padded horizontal foot bar **40** at different heights above the frame **12** and nest together between the support members **42** and the horizontal foot bar **40** in a folded position as shown in **FIG. 2**. In this folded position, spring tension can be used to hold the carriage **22** against the horizontal bar **40**.

One of a pair of spring anchor bar support brackets **48** and a non-rotating spring anchor bar **50** in accordance with a preferred embodiment of the present invention are shown in **FIG. 2**. Each spring anchor bar support bracket **48** is mounted at the foot end of each rail **20** and has a series of upwardly open slanted slots **148**. One end of the non-rotating spring anchor bar **50** is received inside one of the upwardly open slanted slots **148**. The other end of the non-rotating spring anchor bar **50**, received in a corresponding slot **148** in the other spring anchor bar support bracket **48**, is hidden from view. The upwardly open slanted slots **148** are angled so that the openings of the slanted slots **148** are directed toward the foot end wall **18**, that is, away

from the ends of the springs **54**. In this manner, gravity and the relaxed spring tension securely retains the non-rotating spring anchor bar **50** inside the selected pair of the slanted slots **148**.

The embodiment of the non-rotating spring anchor bar **50** illustrated carries a plurality of spaced hooks **52** along its longitudinal axis. These hooks **52** are designed to receive one end of an elastic member such as a spring **54**. The other end of the spring **54** is fastened to the underside of the foot end of the wheeled carriage **22** so as to bias the carriage toward the foot end of the frame. All of the springs **54** are shown attached to the hooks **52** in **FIG. 2** for illustrative purposes only. A user of the exercise apparatus **10** can vary the spring tension applied to the carriage **22** during different exercise routines by changing the combination of the springs **54** attached to the hooks **52** and/or moving the non-rotating spring anchor bar **50** to the other slot in each of the spring support brackets **48**.

A separate perspective view of the non-rotating spring anchor bar **50** according to one embodiment of the invention is shown in **FIG. 3**. The non-rotating spring anchor bar **50** is an elongated bar or tube made from a material such as a metal, plastic, or wood. The non-rotating spring anchor bar **50** can be viewed as having a mid bar portion **303** joining two bar end portions **304**. The mid bar portion **303** and the bar end portions **304** of the non-rotating spring anchor bar **50** may share a common exterior shape and together form one elongated bar such as is shown in **FIG. 3**. Alternatively, the mid bar portion may have a different exterior shape such as is shown in **FIG. 5**.

The two bar end portions **304** are received in one selected pair of the upwardly open slanted slots **148** of the spring support brackets **48**. **FIG. 4** shows a side view of the spring support bracket **48** with one bar end portion **304** received in one upwardly open slanted slot **148**. Two upwardly open slanted slots **148** are shown to be present in each spring support bracket **48** in **FIGS. 2, 4,** and **6**; however, the total number of the slanted slots **148** in a spring support bracket **48** is a matter of design choice. Typically, there may be three to four slots in each spring support bracket **48**.

The bracket **48** has a pair of spaced sidewall portions **404** joining a concave bottom wall portion **406** to form each upwardly open slanted slot **148**. Each bar end portion **304** has a convex bottom portion **410** and a stabilizing portion **412**. The convex bottom portion **410** has an exterior shape preferably generally complimentary to the concave bottom wall portion **406** of the bracket **48** forming the upwardly open slanted slot **148**. The stabilizing portion **412** abuts one or both of the sidewall portions **404** to stabilize the non-rotating spring anchor bar **50** received inside the selected pair of upwardly open slanted slots **148.** This configuration prevents any substantial angular rotation of the non-rotating spring anchor bar **50** in the upwardly open slanted slots **148** about the axis A whenever the bar ends **304** are received within a selected pair of slots **148**.

As shown in **FIG. 4**, the anchor bar **50** is prevented from rotating when each of the bar ends **304** is positioned inside one of the selected pair of upwardly open slanted slots **148**. The convex bottom portion **410** of the bar end portion **304** is received at the bottom of the upwardly open slanted slot **148** and mates with the bottom concave wall portion **406**. The bar end portions **304** are prevented from rotating in either the clockwise or counter clockwise direction since the stabilizing portion **412** of each bar end portion **304** is closely and may be frictionally opposed by the sidewall portions **404** of the slot **148**.

The mid bar portion **303** makes no substantial contribution in preventing angular rotation of the non-rotating spring anchor bar **50** about the axis A in the slots **148** beyond rigidly tying the end portions together. Thus, the exterior form or shape of the mid bar portion **303** need not be identical or even similar to the exterior shape of the bar end portions **304** of the non-rotating spring anchor bar **50**. As an example, **FIG. 5** shows a non-rotating spring anchor bar **550** according to an alternate embodiment of the present invention in which the mid bar portion **503** has an exterior shape different than the exterior shapes of the two bar end portions **504**. The mid bar portion **503** is an elongated cylindrical rod (or a tube). The two bar end portions **504** that join the mid bar portion **503** have the same exterior shape as the two bar end

portions **304** in the first embodiment of the present invention that is shown in and described with respect to **FIGS. 3-4**.

In a manner similar to the embodiment of the present invention described with respect to **FIGS. 3-4**, the two bar end portions **504** of the alternate embodiment are sized to be received in one selected pair of the upwardly open slanted slots **148** of the spring support bracket **48**. **FIG. 6** shows a side view of one bar end portion **504** received in one upwardly open slanted slot **148** of the spring support bracket **48**.

Each bar end portion **504** again has a convex bottom portion **510** and a stabilizing portion **512**. The convex bottom portion has an exterior shape generally complimentary to the concave bottom wall portion **406** defining the upwardly open slanted slot **148**. The stabilizing portion **512** stabilizes the non-rotating spring anchor bar **550** received inside the selected pair of upwardly open slanted slots **148** and prevents substantial angular rotation of the non-rotating spring anchor bar **550** in the upwardly open slanted slots **148** about the axis B whenever the bar ends **504** are received within a selected pair of slots **148**. Again, the bar end portions **504** are prevented from rotating in either the clockwise or counter clockwise direction since the stabilizing portion **512** of each bar end portion **504** abuts against the sidewall portions **404** of the slot **148**.

In general, the non-rotating spring anchor bar (**50** or **550** shown in **FIGS. 3** or **5**) can be made from various materials (e.g., metal, wood, plastic, composite material, etc.) that are either solid or tubular. Further, various exterior shapes are permissible for the mid bar portion **303**, **503** (e.g., cylindrical rod, elongated rectangular bar, etc.). More simply, the anchor bar **550** may be made from an aluminum tube by simply flattening the ends of the tube so as to fit within the slots **148**. Alternatively, the bar may simply be an extrusion, for example, of aluminum, having an oval shape cross-section with parallel side portions as is shown in **FIGS. 3** and **4**.

In addition, various shapes of the bar end portions **304**, **504** are also permissible so long as they can substantially prevent the non-rotating spring

anchor bar (**50** or **550**) from rotating when the bar end portions **304, 504** are received inside a selected pair of the upwardly open slanted slots **148**. Any shape for the bar end portions **304, 504** that achieves this purpose is a suitable shape. For example, it is not a requirement that the bottom portion **410, 510** of the bar end portion **304, 504** must have a convex cross sectional profile that is complementary to the concave cross-sectional profile of the concave bottom wall portion **406** of the slot **148** as shown in **FIGS. 4-6** For example, the bottom of each of the slots **148** may be concave as shown or may be square cornered, with the bottom portions **410** and **510** curved as shown or vice versa. The stabilizing portion **412** and **512** may have a different shape so long as it engages with the sides **404** of the slot **148** to prevent rotation of the anchor bar **50** or **550**.

A further embodiment of the present invention is shown in **FIGS. 7, 8** and **9**. Specifically referring now to **FIG. 7**, the foot end of a reformer **700** is shown. In this embodiment, the reformer **700** has a pair of spaced tubular tracks **702** on which the carriage **704** rolls as in the embodiments described above. However, in this embodiment **700**, the tracks **702** are formed of an extrusion having a square or rectangular tube cross-section. A series of parallel slanted slots **706** are cut through portions of the top and inner sidewalls of the tubular track **702**. This configuration eliminates the need for an anchor bar support bracket as in the embodiments shown in **FIGS. 1-6**. An anchor bar **708** in accordance with the present invention is slip fit into one of these pairs of slots **706** near the foot end **710** of the reformer **700**. This configuration of the tracks **702**, each formed from a single tubular member, with slots near the foot end **710**, greatly simplifies construction of the reformer as well as simplifying operational adjustment of the anchor bar.

A separate perspective view of the anchor bar **708** is shown in **FIG. 8**. The anchor bar **708** is a tubular member, preferably an aluminum extrusion, having two parallel opposite sides **712** that are spaced apart by a distance slightly less than the width of the slots **706** so that each of the bar ends can slip down into one of the slots **706**. The outer shape of the anchor bar **708** is generally an oval shape with two parallel opposite sides **712**. When installed

in the slots **706**, the sides **712** are parallel to the sides of the slots **706** such that rotation of the anchor bar **708** is operably prevented.

The anchor bar **708** also has a flat outer side surface **714** that lies perpendicular to the longitudinal direction of the tracks **702**, thus facing the springs and the carriage **704**. The anchor bar **708** also has a thickened wall portion **716** behind this surface **714** to support a plurality of anchors **718** which are each fastened in place in bores **720** through the portion **716** with a pair of nuts **722**. The anchor bar **708** also has a series of holes (not shown) through the curved wall portion opposite the thickened portion **716** to permit access to the nuts **722** within anchor bar **708**.

The specification and the drawings included herein disclose various embodiments of the present invention. However, the specification and the drawings of the present invention do not aim to disclose all variations of the reformer exercise apparatus and/or the anchor bar or all components that are used as in a reformer exercise apparatus. It is to be understood that the anchor bar of the present invention may be practiced in various exercise apparatuses other than as specifically described herein. For example, the angle of the slots in the anchor bar support brackets or, in the case of the embodiment shown in **FIG. 7**, the slots in the track members **702**, may be different in other reformers than that illustrated, and thus the placement of anchor hooks or other attachment devices may be different from those shown. In one alternative, the mid portion may simply be a rod over which hooks on the ends of the springs may be attached. The hooks may be replaced with eyes or vertical posts, etc. The oval cross section of the end portion may also be changed so long as its shape interferes with rotation of the bar in the slots **148** or **706**. Numerous other changes may be made which will readily suggest themselves to those skilled in the art and which are encompassed in the spirit of the invention disclosed and as defined in the appended claims.